CLAIMS

1. A phosphor comprising a silicon-containing solid matrix and semiconductor superfine particles dispersed therein at a concentration of 5×10^{-4} to 1×10^{-2} mol/L, said semiconductor superfine particles having a fluorescence quantum yield of 3% or greater and a diameter of 1.5 to 5 nm.

2. The phosphor according to claim 1, wherein the silicon-containing solid matrix is a glass matrix formed by a sol-gel process.

3. The phosphor according to claim 2, wherein the silicon-containing solid matrix is a glass matrix formed by a sol-gel process using an organoalkoxysilane.

4. The phosphor according to claim 3, wherein the organoalkoxysilane is a compound expressed by the formula:

$$X_n\text{-}Si(OR^1)_{4-n} \qquad (I)$$

wherein X is a group expressed by CH_2=CH-, an oxirane-containing group, a group expressed by $H_2NC_mH_{2m}$-, a group expressed by CH_2=$C(CH_3)COOC_pH_{2p}$-, a group expressed by HSC_qH_{2q}-, or a phenyl group; R^1 is a lower alkyl group; *n* is 1, 2, or 3; *m* is an integer from 1 to 6; *p* is an integer from 1 to 5; and *q* is an integer from 1 to 10.

5. The phosphor according to any one of claims 1 through 4, wherein the semiconductor superfine particles are substantially monodispersed in the silicon-containing solid matrix.

6. The phosphor according to claim 5, wherein the semiconductor superfine particles comprise at least one member selected from the group consisting of cadmium telluride, zinc telluride, zinc selenide, cadmium selenide, cadmium sulfide, indium arsenide, and indium phosphide.

7. The phosphor according to claim 6, wherein the semiconductor superfine particles comprise cadmium telluride, and the superfine particles are obtainable by adding a surfactant to an aqueous solution of cadmium perchlorate, adding hydrogen telluride or sodium hydrogen telluride, and then refluxing the mixture.

8. The phosphor according to claim 1, wherein the concentration of semiconductor superfine particles in the silicon-containing solid matrix is 1×10^{-3} to 8×10^{-3} mol/L.

9. A light-emitting device comprising the phosphor according to claim 1, and a light source for emitting excitation light with an intensity of 3 to 800 W/cm^2.

10. A light-emitting device comprising the phosphor according to claim 1, and a light source selected from the group consisting of a mercury lamp, a semiconductor light-emitting diode, a semiconductor laser, and a solid-state laser.

11. The light-emitting device according to claim 10, wherein the light source is a semiconductor light-emitting diode, semiconductor laser, or solid-state laser.

12. The light-emitting device according to any one of claims 9 through 11, wherein the light source is an ultraviolet semiconductor light-emitting diode with an excitation wavelength of 200 nm or greater but less than 400 nm, or an ultraviolet semiconductor laser with an excitation wavelength of 200 nm or greater but less than 400 nm.

13. The light-emitting device according to any one of claims 9 through 12, wherein the light source is an intermittently pulsing light source.

14. The light-emitting device according to any one of claims 9 through 13, wherein the optical density (OD) of the phosphor according to claim 1 at the excitation wavelength is $0.7 < OD < 5$.

15. The light-emitting device according to any one of claims 9 through 14, wherein the light-emitting device is a display panel or a light.

16. A method for manufacturing a display panel, wherein a slurry containing pulverized phosphor according to claim 1, a water-soluble photosensitive resin, and water, is applied to a substrate, and the resin is cured by irradiation with light.

17. A thin film comprising the phosphor according to claim 1.

18. The thin film according to claim 17, wherein the film thickness is 10 microns or less.

19. A method for forming a thin film comprising the phosphor according to claim 1, wherein the film is produced by a sol-gel process using an organoalkoxysilane.

20. A method for forming on a substrate a thin film comprising the phosphor according to claim 1, wherein the film is produced by a sol-gel process using an organoalkoxysilane.

21. A method for manufacturing the phosphor according to claim 1, wherein the semiconductor superfine particles are fixed in the silicon-containing solid matrix and are then exposed to a reducing gas.

22. The method for manufacturing a phosphor according to claim 21, wherein the semiconductor superfine particles are fixed in the silicon-containing solid matrix by a sol-gel process using an organoalkoxysilane and are then exposed to hydrogen gas or hydrogen sulfide gas.

23. A phosphor obtainable by the manufacturing method according to claim 21 or 22.

24. A light-emitting device comprising the phosphor according to claim 23 and a light source for emitting excitation light with an intensity of 3 to 800 W/cm^2.